



Risk Assessment

Maeda Mini Crawler Crane MC305C-2



SAFETY

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WARNING

All the safety precautions defined in this manual should always be read and observed.
Failure to follow the safety precautions can cause serious personal injury or death.

1. BASIC PRECAUTIONS

OBSERVE THE MANUAL AND SAFETY LABELS

- Read well and understand this manual as well as the safety labels labeled on various part of this Machine. Attempt to drive/operate without understanding fully may result in wrong operation that may cause personal or equipment accidents.
 - Fully understand the proper use and inspection/maintenance procedures, and exercise safe works.
 - Make sure this manual and the safety labels labeled on various part of this Machine are legible all the time.
- Whenever illegibility or loss occurs, order us or our sales service agency and put the safety label back to the original location.



DRIVING LICENSE

- Licenses are necessary to drive this Machine. Always obtain licenses before driving.
- * See "Introduction 4. Qualification for Operation" for details
- The drivers are requested to receive educations and training of the handling methods and other subjects in the applicable office, and obtain sufficient driving operation skill before work.

WEAR PROTECTIVE EQUIPMENT AND CLOTHES SUITABLE FOR WORK

- Always put on a helmet, safety shoes and safety belt.
- Select and make sure to put on necessary protective equipment suitable for the relevant working condition.
- Do not wear loose garment or accessory item that may catch operation lever or protrusions and cause unexpected movement of the Machine.



COMMIT TO SAFE OPERATION

- Obey the instructions and signs given by the manager and work supervisor, and observe safety first during the work.
- Obey the crane work basics during work.
- Before starting driving or a work, always carry out the inspections before work.
- Do not work under bad weather for instance strong wind, thunder or mist.
- Do not drive under any condition when you are overtired, dosed with alcohol or after taking a somnific drug.
- Obey all of the workplace rules, safety regulations and operation method sequences during driving operations and inspection/maintenance.
- Pay attention to surrounding conditions and pedestrians all the time when driving or working. Whenever pedestrian approaches unwarily, abort working once, and take a measure such as issuing a warning.
- When driving, be mentally prepared for unexpected situation and so that you can take measures immediately.
- Do not attempt any use out of the capabilities and purposes described in this manual under any circumstance.
- Observe the designated rated total load and work range when driving.
- Do not attempt inattentive driving, harsh driving or awkward operation under any circumstance.
- Pull out the key when leaving operation seat.

USE OF MACHINE THAT WAS RENTED OR PREVIOUSLY USED BY SOMEONE ELSE

Check the following subjects on writing before using any Machine that was rented or previously used by someone else.

In addition, check the inspection record table for the maintenance conditions such as the periodic inspections.

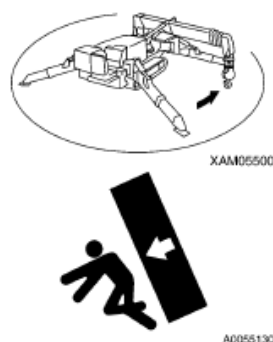
- (1) Crane capacity
- (2) Crane maintenance condition
- (3) Behavior and disadvantage unique to the crane
- (4) Other subjects that require attention when driving
 - (a) operating condition of the brakes, crutches and others
 - (b) Presence/absence and lighting condition checkup of lightings and rotating lamps
 - (c) Operation condition of hook, winches, boom, outriggers and related

PROVIDE SAFETY DEVICES FOR SURE

- Check that all guards and covers are attached properly. Repair immediately if damaged.
- Understand how to use the safety devices well and use properly.
- Do not detach any safety device under any circumstance. Keep control to achieve proper function all the time.
- Improper use of safety device leads to serious bodily accidents.
- Do not trust safety device too much to operate.

Follow instructions and signs when working

- When working with the crane, appoint a work supervisor and mutual signs beforehand, and follow the work supervisor and signs during work.
- When working at a location where many parts are unsealed from the driver, be especially careful to follow the instructions and signs of the work supervisor and pay attention when driving.
- When working with the crane, the clearance between the boom and the traveling dolly and also the gaps between the movable parts of the derrick cylinder may catch body parts such as an arm or finger. The driver is requested to make sure no one is within the working radius of the crane before operating crane.



PREPARE FOR ABNORMALITY

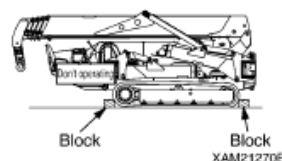
- Carry out secure inspections and services, and be careful to prevent accident before happening.
- Whenever you feel abnormality of the Machine, abort working immediately, ensure safety and report to the manager.
- Assign in advance who takes which solution to prevent secondary accident.
- Do not drive the Machine when fuel or hydraulic oil is leaking from the Machine. Report the manager what is the abnormality, and fully repair the fuel/hydraulic oil before use.
The fuel for this Machine is light petroleum. Be especially careful for presence of fuel leak.
- Before leaving the Machine, lower the hoisted load to the ground, stop the engine and pull out the engine key.



TEMPORARY STORAGE WHEN ABNORMALITY IS FOUND WITH MACHINE

In case the Machine is found with abnormality and is therefore stored temporarily waiting for service, apply following measures to notify all persons in the office that the use is prohibited due to failure.

- Indicate warning tags on the crane operation lever and other applicable parts.
Write clearly the information such as abnormality contents, name and contact of the storage manager, and the term of storage.
- Keep immovable when parking by for instance putting the blocks on the rubber tracks as pawls.
- Pull out the engine key and bring with you.



PROVISION OF FIRE EXTINGUISHER AND FIRST AID BOX

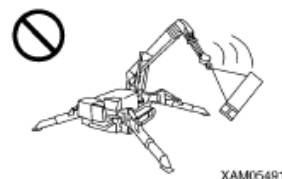
Always observe followings to prepare for injuries and fires.

- To prepare for fires, decide the fire extinguisher storage location and install one, fully read the attached label for the usage and be prepared for fighting against the emergencies.
- Decide the location to store the first aid box. In addition, inspect the first aid box periodically and replenish the contents as necessary.
- Decide the measures to take upon an injury or fire accident.
- Decide how to contact the emergency address (for instance the emergency physician, ambulance or fire department), and show the contact address at designated position so any person can make the contact.



DO NOT RUSH AND BE CAREFUL WHEN WORKING

- Do not attempt sudden lever operation or harsh driving.
- When two or more cranes work close to each other, drive carefully while paying attention to accidents such as trips caused by contacting each other. Also, appoint a guide if necessary for increased prevention of contact accidents.
- When abnormality or danger occurs during work, abort working immediately to avoid hazard.
- Abort the work under bad weather (heavy rain, strong wind, thunder, thick fog).
Decide whether to abort working by seeing the "work abort decision standard" in the work schedule and by discretion of the work supervisor of the site.



DO NOT MODIFY

Do not modify the Machine without our written consent under any circumstance.
The modification raises a safety issue, so consult us or our sales service agency beforehand.
We cannot be held responsible for any bodily accident or failure caused by modification that was performed without consulting us.

SAFETY WHEN REFILLING FUEL

- Light petroleum is used as the fuel of this Machine.
Do not refill wrong kind of fuel.
Refilling wrong oil may damage the engine.
- Always stop the engine before refilling fuel.
Refilling the oil when engine is driving may cause leaked fuel to draw fire from hot muffler or other substance.
- Oversupply of oil results in spilling and is dangerous. Refill slightly fewer than the specified level.
Always wipe away cleanly whenever the fuel spills.
- Securely close the tank cap after replenishing fuel.



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KEEP FIRE AWAY FROM OIL

Attempt to let a fire approach the fuel, hydraulic oil or engine oil may result in catching fire. Strictly observe the followings.

- Do not let any fire such as a cigarette or match approach combustibles.
- Securely close all of the fuel and oil container caps.
- Keep the fuel and oils in well-ventilated location.
- Store the fuel and oils in a fixed location and keep unrelated persons away.
- Do not leave the site when replenishing the fuel or oil.
Be especially careful to observe "Safety when refilling fuel" described earlier when replenishing oil.
- Cleanly wipe away fuel and oil that spilled during replenishment.



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HANDLING HIGH TEMPERATURE

During short time after stopping operation of the Machine, the engine itself and engine oil, cooling water and hydraulic oil are in high temperature, and in addition the pressure is accumulated inside the hydraulic oil tank.

Attempt to inspect the engine, remove the radiator cap, drain oil, drain water or replace the filter under such condition may result in burns.

Wait until the temperature drops, then follow the following sequences.

- To prevent emission of the high temperature oil, stop the engine and wait until the oil temperature drops, and when loosening the cap, turn slowly and relieve the pressure before detaching the cap. (To find how much the oil temperature dropped, let your hand approach the surface of the hydraulic oil tank or similar location without actually contacting and find out from the ambient temperature.)



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BEWARE OF ASBESTOS DUST

Inhalation air containing asbestos may result in lung cancer. This Machine does not use any asbestos, but asbestos may be contained in the wall, ceiling or other part of construction within the work area of this Machine. In addition, be careful of the followings when working with a material that may be using asbestos.

- Put on designated dust free mask and/or other equipment as necessary.
- Do not use compressed air for cleaning.
- Spray water when cleaning to prevent asbestos dusts from flying into air.
- Always work at windward location when driving the Machine at a site that may contain asbestos dusts.
- Strictly observe the assigned rules related to the working site and environmental standard.



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CRANE INJURY PREVENTION

Do not let whole or part of your body enter any of the following clearances, since such act may cause serious bodily accidents.

- Between the boom and the traveling dolly.
- Between the outrigger support and the ground contact surface.
- Between the boom/post and the derrick cylinder.
- Between the winch drum and the wire ropes.
- Between sheaves and wire rope.
- Between the crawlers and the ground.



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BEWARE OF EXHAUST GAS

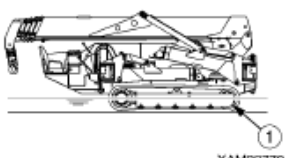
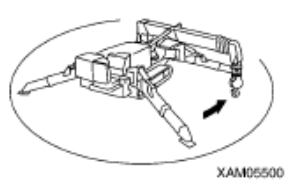
When starting the engine or handling fuel/cleaning oil/paint indoors or at a location with bad ventilation condition, prevent gas-poisoning risk by improving the ventilation by opening the windows and exits. If the ventilation is insufficient even after opening the windows and exits, set up a ventilation fan.



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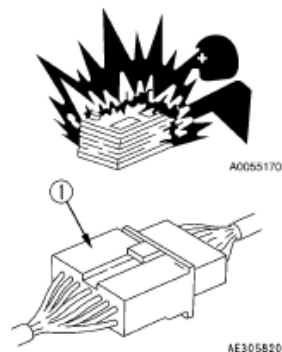
2. DRIVING RELATED PRECAUTIONS

2.1 BEFORE STARTING ENGINE

ESTABLISH SAFETY OF WORKING SITE	
• Confirm that no danger is present at the working site before starting work. • Investigate the ground and road surface condition of the working site and decide the best working method. • Flatten the inclination of the working site as much as possible before starting work. Also, if sands and gravels are excessive, spray water before work. • When working over the roadway, enforce keep out by for instance placing guides or surrounding by barriers, and ensure the safety of the traffic vehicles and pedestrians. • Enforce keep out to prevent people from entering the working site and apply measures to prevent people from approaching. Attempt to approach moving Machine may result in hard collision by contact or pinching, and may result in serious bodily accidents and deaths. • When traveling in the water or crossing over shallow water, check the ground condition, depth and water velocity beforehand and make sure not to exceed the allowable water depth (no higher than center of idler (1)). * See "Operation 2.12 [2] Allowable Water Depth" for details	 XAM22770
INSPECTION BEFORE STARTING ENGINE	
Execute following inspections before the first engine startup of the day. Omitting these inspections may result in serious bodily accidents. • Inspect for the fuel/oil leak, accumulation of combustibles around the engine and battery systems, and similar phenomenon. * See "Operation 2.1 Checking Before Operation" for details. • Inspect the fuel quantity, cooling water quantity, hydraulic oil tank quantity, air cleaner blockage, electrical wiring damage, and check operations of safety devices and instruments. * See "Operation 2.1 Checking Before Operation" for details. • Make sure the operation levers are at neutral position. Check that the operation linkages operate adequately. Always repair if any result of the above is faulty.	 A0055020
CAUTIONS WHEN STARTING ENGINE	
• Make sure no person or object is within the boom swing radius area before starting engine. • Blow the horn for warning before starting the engine. • Do not start the engine by short-circuiting the starter circuit. Such may cause a fire.	 XAM05500

CAUTIONS UNDER COLD WEATHER

- Remove snow from and defreeze the swing gear, boom and winch related parts, and check the movements before work.
- Warm up enough.
Attempt to operate the operation levers and switches without enough warm-up causes the Machine to react dull, and may result in unexpected accidents.
- Avoid acutely accelerating the engine during short time after starting the engine.
- Increase the oil temperature of the hydraulic circuit by relieving the oil pressure (let the pneumatic oil to escape to the hydraulic oil tank by raising to above the hydraulic circuit set pressure) by using operation lever. Doing so improves the Machine reactions and prevents improper operations.
- If the battery fluid is frozen, do not charge battery or start the engine using other power source.
Such act may cause the battery to catch fire.
Before charging or starting up using other power source, defreeze the battery fluid and check that failures such as battery fluid leak do not exist.
- After end of the work, wipe off and apply wraps if substances such as condensation, snow or mud are stuck to the wire harness, connector (1), switches, sensors or similar part.
If the infiltrated condensation and/or similar substance freezes, the Machine may operate improperly upon the next use and cause unexpected accidents.



2.3 WORKING WITH CRANE

INSPECTION BEFORE STARTING WORK

- Check that the safety devices and crane operate properly.
- Operate each of the operation levers and switches under no load, and check that operations take place without abnormality.
Repair immediately if any abnormality exists.
- Check that the safety devices such as the moment limiter, outrigger safety device, and over hoist detector / automatic stop device activate properly.

CAUTIONS WHEN HANDLING MOMENT LIMITER

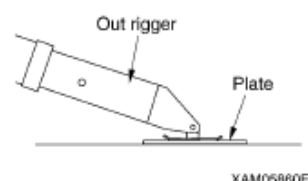
- Use/store the moment limiter under the following ranges of ambient temperature.
* Temperature of use: 10 to 50 °C Storage temperature: -20 to 60 °C
- Avoid direct sunlight so that the temperature of the moment limiter body does not exceed the above range.
- Avoid locations with strong acid or alkaline atmosphere as much as possible. Otherwise, unexpected failures may occur.
- Do not apply impact to the moment limiter body for instance by colliding with an object.
Such attempt may damage the case and may result in failures and improper operations.
- Do not push the panel sheet of the moment limiter body by a force more than necessary or push with sharp object such as a tip of a screwdriver. Such act may damage the panel sheet and may result in failures and improper operations.
- Do not remove the case cover or panel sheet from, or disassemble the moment limiter body. Such act may damage case and/or panel sheet and may result in failures and improper operations.

CAUTIONS WHEN SETTING UP MOMENT LIMITER

- The moment limiter calculates the moments assuming the Machine is level.
If you work with the crane when the Machine is not level, warnings and alarms are not issued even when the rated total load is near.
Always set the outrigger horizontally to the ground while looking at the level gauge.
- Before using the moment limiter, check that the boom angle display, boom length display and real load display are displayed correctly following the crane movements. Attempt to use without correct display results in failure to obtain correct measurement result and may result in serious bodily accidents caused by reasons such as an improper operation and/or breakage of nearby equipment.
- Always make sure the wire strand setting of the moment limiter matches with the wire strand of the crane. If the wire strands do not match, always let the wire strands match by changing the wire strand setting of the moment limiter or by changing the wire strand of the crane. Attempt to use with unmatched wire strands results in failure to obtain correct measurement result and may result in serious bodily accidents caused by reasons such as an improper operation and/or breakage of nearby equipment.
- Do not carelessly change the setting when measuring with the moment limiter. Such attempt results in failure to obtain correct measurement result and may result in serious bodily accidents caused by reasons such as an improper operation and/or breakage of nearby equipment.

PLACE CRANE ON LEVEL AND HARD SOIL

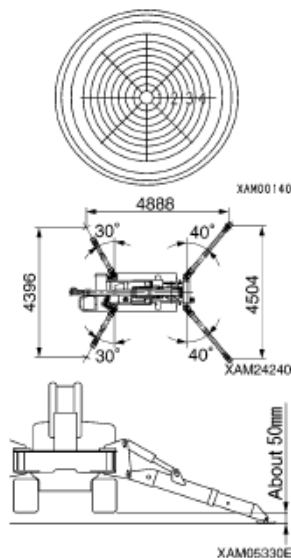
- Always place the outriggers on a level, stable and solid ground.
Attempt to work with crane without outriggers firmly contacting the ground may cause the Machine to trip.
- Always place all outriggers before working with crane.
- Do not set any outrigger near the location that may collapse, for instance a soft ground, roadside or drilled hole.
In case the outriggers need to be placed on a soft ground for unavoidable reason, always reinforce the ground by laying a sufficiently large and strong base plate below each of all outrigger supports.



CHECK OUTRIGGER PLACEMENT CONDITION

Always observe followings to prevent serious injuries and death accidents when placing the outriggers.

- When placing the outriggers, always keep the Machine sternly level while looking at the level gauge. Occasionally view the level gauge and make sure to keep the Machine level during the crane works as well.
- Place the outriggers at a maximum extension condition as the basic rule.
In case of placing in a non-maximum extension condition for unavoidable reason, always find the values outrigger middle extension or outrigger minimum extension values in the total rated load chart before work.
- Place the outriggers in a style that the rubber tracks are approximately 50 mm above the ground.
- Make sure all of the outrigger position pins are securely fixed.



CAUTIONS WHEN PLACING OUTRIGGER

- Do not let people approach nearby when placing the outriggers. Otherwise, serious accidents for instance the outrigger support catching a foot may occur.
- Always set the emergency stop cancel switch at side of the instrument panel to OFF (auto) position before outrigger operation. Do not attempt any outrigger operation with the emergency stop cancel switch at ON (cancel) position. Inspections and maintenance works are the only occasions where the emergency stop cancel switch is set to ON (cancel) position.



BEWARE OF ELECTRICAL CABLE ABOVE

- Do not let the Machine contact with electrical cables above. High voltage cables may inflict electrical shock by mere approaching.

- Persons who sling are likely to suffer electrical shocks.

Always observe followings to prevent accidents.

- If the boom or the wire ropes may contact an electrical cable in the workplace, consult the electricity company and make sure that the measures (measures for instance placement of a guard personnel or application of wrap tubes and warning tags to the electrical cable) stipulated by the related regulations are taken before starting work.

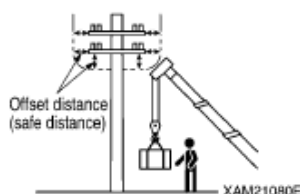
- Put on rubber soled shoes and rubber gloves, and be careful that the body parts unprotected by rubber or other insulation do not contact the wire rope or the Machine frame.

- Place a guide and let him/her watch so that the boom, wire rope or Machine frame does not go near the electrical cable too much. Before doing so, decide the emergency signs and other necessities.

- Ask the electricity company for the voltage in the electrical cables in the working site.

- Ensure the offset distances (safe distance) shown in the following table between the boom/Machine frame and electrical cables.

	Voltage of Electrical Cable	Minimum Safe Distance
Low voltage (Distribution line)	100-200V	2m
	6,600V	2m
Special (Transmission line)	22,000V	3m
	66,000V	4m
	154,000V	5m
	187,000V	6m
	275,000V	7m
	500,000V	11m



MEASURES WHEN CHARGE ACCIDENT OCCURS

When an electrical charge accident occurred, do not panic but calm down, and apply solution by the following sequence.

1. Report

Immediately report to the electricity company or related management company, and receive instructions for the power transmission stop, emergency procedures and related.

2. Evacuation of related personnel from vicinity of Machine

Let the related personnel including the workers from vicinity of the Machine to prevent secondary disasters.

Personnel who suffered electrical shock by holding a sling rope, guide rope or other conductor when the Machine was charged should evacuate by his/her own effort.

Do not try to help such person. Otherwise, secondary electrical shock accident occurs.

3. Emergency procedure

Take the solution by following sequence in case of urgency where personnel received electrical shock because the Machine was charged.

(1) If the Machine can be operated, immediately operate the Machine to move the Machine constructions away from the contact and out of the range of the cause of the charge. Be careful not to snip the distribution power cable.

(2) Evacuate the Machine completely away from the cause of the charge, make sure the Machine is not charged, rescue the electrically shocked personnel and immediately carry to the hospital.

4. Measure after accident

After accident, do not reuse as is. Such attempt may cause unexpected accidents and enhances failures.

Ask us or our sales service agency for repair.

CAUTIONS WHEN WORKING WITH CRANE IN LOCATION WITH HIGH OUTPUT MICROWAVE EMISSION

Working with crane near a high output microwave emission equipment such as a radar or TV/radio broadcast antenna causes the crane construction to be exposed to the microwave and generates induced current, therefore is very dangerous. In addition, the mechatronics may become haywire.

Establish grounding between the Machine frame and the ground when working in such location. In addition, slingers are requested to wear rubber boots and rubber gloves since risk of electrical shock by contacting parts such as the hook or wire exists.

PAY ATTENTION TO WEATHER INFORMATION

- In case of thunderstorm, risk of lightning exists, so abort working with crane, immediately lower the load and contain the boom.
- Exposing the hoisted load to wind causes the load to waggle and causes the Machine to be unstable, thus is dangerous. Immediately lower the load and contain the boom when the wind is causing the load to waggle.
- If the maximum instantaneous wind speed is 10 m/s or greater, abort working with crane, immediately lower the load and contain the boom.
- Even when the maximum instantaneous wind speed is below 10 m/s, bigger the hoisted load, higher the hoisted load position, and longer the boom, the wind effect increases accordingly. Be fully careful during work.
- When a load such as a steel plate that has a large area exposed to wind is being hoisted, the wind arriving from front/rear/side of the boom may cause the Machine to trip or damage the boom. Be fully careful when working.
- When an earthquake occurs, abort working and wait until the earthquake is over.
- * The following table indicates approximate relation between the wind speed and wind effect. The wind speed mentioned in the weathercast is mean wind velocity (m/s) during 10 m at 10 m above the ground.

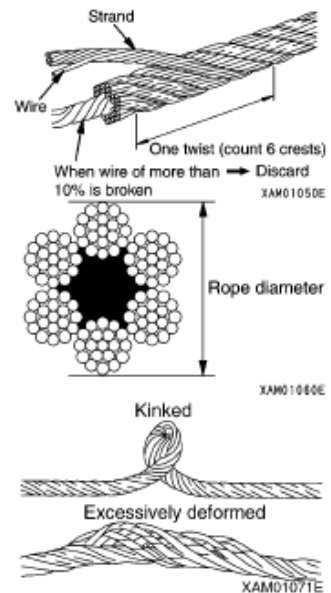
Force	Wind Speed (m/s)	Effect On Land
0	Less than 0.3	Smoke rises vertically.
1	0.3 - below 1.6	Wind motion visible in smoke.
2	1.6 - below 3.4	Wind felt on exposed skin.
3	3.4 - below 5.5	Leaves and smaller twigs in constant motion.
4	5.5 - below 8.0	Dust and loose paper raised. Small branches begin to move.
5	8.0 - below 10.8	Smaller trees sway. Some foam and spray.
6	10.8 - below 13.9	Large branches in motion. Whistling heard in overhead wires. Umbrella use becomes difficult.
7	13.9 - below 17.2	Whole trees in motion. Effort needed to walk against the wind.
8	17.2 - below 20.8	Twigs broken from trees. Progress impeded.
9	20.8 - below 24.5	Light structure damage. Slates blown off.
10	24.5 - below 28.5	Trees uprooted. Considerable structural damage.
11	28.5 - below 32.7	Widespread structural damage.

CAUTIONS WHEN SLINGING

- Check the following before hoisting a load.
Attempt to hoist the load without checking may result in serious bodily accidents by a drop of the load or tripping.
- Observe the values in the total rated load chart.
- Hoist from the center of gravity of the load.
- Check that the wire ropes of the hook block are perpendicular to the ground.
- When the load leaves the ground, stop winding up the load once and check whether the load is stable.
- Before hoisting a slung load, always check whether the sling wire rope "retainer device" of the hook block is hung for sure. If the "retainer device" is not hung, the wire rope may leave the hook block and cause the load to fall and results in a serious accident.
- Larger wire rope angle when hoisting the load increases force that applies to the wire rope even when the load weight is unchanged, thus may cause the wire rope to snap. Pay enough consideration well when slinging to prevent excessive force from applying to the wire rope.
- Do not hoist more than loads at once.
Such attempt may cause the hoist bracket to hit and damage the other hoisted load, the loads to move and lose balance and cause trip, or other cause of serious accidents.
Do not hoist more than one load even if the total is within the rated total load.
- Hoisting of lengthy load causes the load to lose balance and is dangerous.
In case such load, hoist vertically by using a clamp, or achieve balance of the hoisted load by applying a rope to both ends of the load.

CAUTIONS WHEN HANDLING WIRE ROPE

- The wire rope fatigues as the time passes, so inspect every time before work, and replace immediately if at or beyond the replacement standard.
At the same time, inspect the sheave at the tip of the boom and the sheave of the hook block. Damaged sheaves accelerate the damage of the wire ropes.
- Use the wire ropes specified by us.
- Always put on leather gloves when handling the wire rope.
- Handling worn and damaged wire may cause injury by wire splinter.
- Do not use any wire rope of which any of the followings apply.
 - 10% or more of the wires (except the filler wires) in one twist of the wire rope are snapped.
 - The wire rope diameter abrasion is beyond 7% of the nominal diameter.
 - Is kinked.
 - Is excessively deformed or corroded.
 - Affected by heat or sparks.

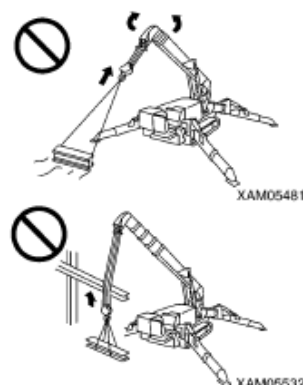


CAUTIONS WHEN WORKING WITH CRANE

- Be sure to verify that the emergency stop cancel switch is at OFF (auto) position before operating the crane.
Do not attempt the crane operation when the emergency stop cancel switch is at ON (cancel) position. The emergency stop cancel switch is permitted to be at ON (cancel) position only during the inspection or maintenance works.
- Crane works are not possible when the outriggers are placed in extension condition. Also, the crane work becomes halted when an outrigger support leaves the ground during the crane work. Securely place the crane in the extension condition, and avoid operations and works that may cause the machine to vibrate when working with the crane.
- Attempt to work beyond the capacity of the Machine may cause serious accidents and failures caused by for instance tripping or fluctuation. Observe the total rated load chart when working with the crane.
- Do not travel with a load being hoisted under any circumstance.
Such attempt may cause the crane to trip and may result in serious bodily accidents.
- Be slow when operating the crane.
Sudden lever or accelerator operations may cause risks such as wagging or fall of the load and collision with the surrounding. Be especially careful to be slow during the swing operations.
- Do not let people approach the work radius or below the load, since risks such as fall of the load and contact with the load exist. Such attempt may result in serious bodily accidents. Also, during the work, consider the fact that the working radius increases when the load is hoisted and the boom is deflected thus.
- Attempt to work with the crane even when the view is bad due to location or weather is dangerous.
Ensure brightness by posting a work lamp or other illumination facility in dark places.
When the view is bad because of bad weather (rain, fog, snow), abort working and wait until the weather recovers.
- Do not use for purpose, for instance raising a person using a crane, other than the true purpose.
- If the overwinding detector alarm buzzer is heard, immediately leave your hand from the winch lever. The hook block winding stops. Then, operate the winch lever to Down (push forward) to wind down the hook block. In addition, the hook block is wound up when the boom is extended, so be sure to ensure extra clearance between the boom and the hook block during work.
- When the boom extends, the hook block is wound up.
Operate the winch lever to Down (push forward) to wind down the hook block while you extend the boom.
- Whenever an overload occurs during work, lower the load by winding down the winch by setting the winch lever to Down (push forward).
Do not raise or lower the boom acutely. Such attempt may cause serious accidents by tripping.
- The volume of the hydraulic oil in each of the cylinders changes depending on the temperature.
By leaving idle with a load being hoisted, as the time passes by the oil temperature drops and the hydraulic oil volume decreases, and changes such as the boom derrick angle decrease and boom length decrease may occur.
In that case, execute boom derricking operations and boom extension operations appropriately to correct.
- Do not leave the driving operation position when a load is hoisted.
Lower the load before leaving the Machine.
- Keep the hook block wound up when not in use.
Otherwise, person near the load may collide the hook block without load.
- Operator must not leave operation seat during operation.

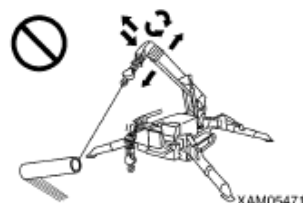
CAUTIONS WHEN OPERATING WINCH

- Do not let persons enter below the hoisted load.
 - When hoisting a load, always stop once at the "takeoff" position where the hoisted load leaves the ground. Check subjects such as load stability and load force, then hoist up the load.
 - Do not pull laterally, pull toward you or hoist diagonally. Such attempt may cause the crane to trip or suffer damage.
 - Overwinding of the hook block may result in collision with the boom, snipping the wire ropes and causes the hook block and load to fall and cause serious accidents. Be fully careful to prevent overwinding the hook block.
 - Be careful to prevent the wire rope and/or hoisted load from contacting an obstacle such as a tree or steel when hoisting a load. If caught by an obstacle, do not forcibly wind up the hoist load, but untangle the caught part before winding up.
 - Do not use the winch drum wire rope in random condition. If random, not only the wire rope suffers damage and shortens the lifetime, but the wire rope may snip and causes serious accidents. Observe following precautions to avoid wire rope from becoming random.
 - Do not let the hook block hit the ground.
 - Before leaving the hook block lowered for a long time for instance when working with underground, leave at least three loops of wire rope in the winch drum.
 - If the wire rope is twisted and causes the hook block to turn, fully eliminate the twist before work.
- * See "Operation 4.2 What to do with Twisted Winch Wire Rope" for details.



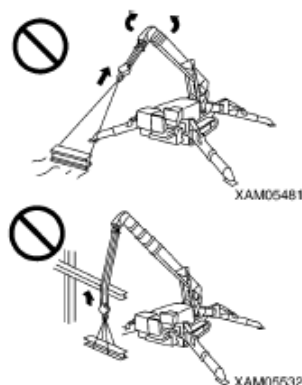
CAUTIONS WHEN OPERATING BOOM

- Be slow as much as possible when operating the boom operation lever. Especially avoid sudden lever operations when the load is hoisted, which may cause the load to waggle and give large impact to the Machine, and thus may damage the crane or trip the Machine.
- When the boom is lowered, the working radius increases, and the rated total load that can be hoisted decreases. When working while raising/lowering the boom, pay extra attention so that the mass (weight) of the load at the time the boom is most lowered does not cause overloading.
- Attempts to pull the load laterally or pull to bring forth the load by raising/lowering and/or extracting/retracting operation of the boom are prohibited. Do not attempt under any circumstance.
- Be aware of the hook block windup condition and exercise caution when extending or retracting the boom.
- When the boom is extended, the working radius increases, and the rated total load that can be hoisted decreases. When working with extending/retracting the boom, pay extra attention so that the mass (weight) of the load at the time the boom is most lowered does not cause overloading.



CAUTIONS DURING SWING OPERATION

- Check the safety in the vicinity and blow the horn before swinging.
- If the boom derrick angle is small, be careful to prevent the boom from hitting the driver or the Machine.
- Be slow as much as possible when operating the swing lever. Make sure to start smoothly, swing slow, and stop quietly. Especially avoid sudden lever operations when the load is hoisted, which may cause the load to waggle and cause the Machine to lose balance, and thus may damage the crane or trip the Machine.
- Attempts to pull to bring forth the load or let the load stand up by swinging operation are prohibited. Do not attempt under any circumstance.
- Be careful to prevent the wire rope and/or hoisted load from contacting an obstacle such as a tree or steel when hoisting a load or when swinging. If caught by an obstacle, do not forcibly wind up the hoist load, but untangle the caught part before winding up.
- Certain outrigger extension condition may cause the boom to hit an outrigger and cause the crane to be damaged or the Machine to trip. Be careful to prevent the boom from hitting outriggers during swing operation.



COOPERATION HOISTING IS PROHIBITED AS THE RULE

Cooperation hoisting, that is to use more than one crane to hoist a load, is prohibited. The cooperation hoisting work is a highly hazardous work that may cause for instance a trip of the Machine due to uneven center of gravity, fall of the hoisted load or boom damage. If the need to work so exists for unavoidable reason, establish a work scheme by responsibility of the user, discuss fully, let the worker fully acknowledge the work method and procedures, then work carefully under the direct leadership of the work supervisor. And, observe the following cautions as well.

- Use the cranes of same model.
- Choose the Machine model that can handle sufficiently larger load than the load to be hoisted.
- Make sure only one person gives signs.
- Limit the crane operations to single operations as the rule, and do not attempt any swing operation.
- Appoint one responsible slinger who is most experienced.

WORKING AT THE SITE WITH UNDERGROUND LIFTING

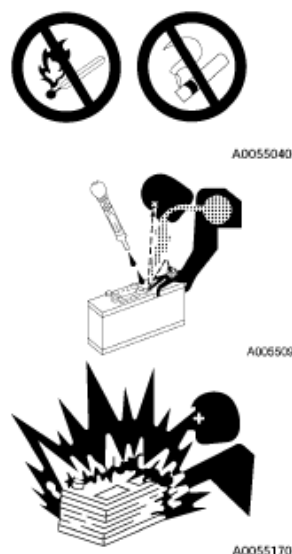
- Leave at least three loops of wire rope in the winch drum when winding down the wire rope in case of underground work or similar occasion. This Machine is equipped with three-winding stop alarm / automatic stop device as the safety device, but even then be fully careful to prevent this safety device from activating.
- Make sure signs are communicated fully.
- Be especially careful with the crane operations.

4. BATTERY HANDLING PRECAUTIONS

BATTERY HANDLING CAUTIONS

The battery fluid includes diluted sulfuric acid, and generates hydrogen gas, and causes bodily accidents and fires if handle improperly, so always observe the followings.

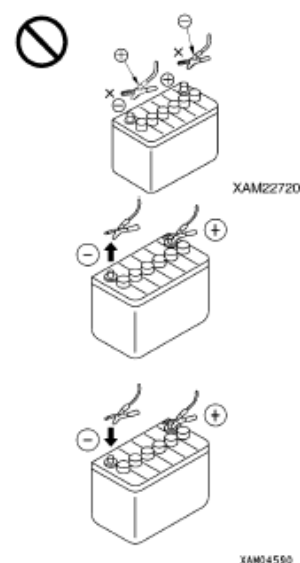
- Do not let a cigarette or any fire source approach the battery.
- Always put on protective glasses and rubber gloves before handling the battery.
- If the battery fluid contacted clothing or skin, immediately wash away by huge quantity of water.
- If the battery fluid entered an eye, wash immediately with water and see the doctor as soon as possible.
- If you have swallowed the battery fluid by mishap, immediately drink huge quantity of water, milk, raw egg or vegetable oil, and see the doctor as soon as possible.
- Wipe with a wet clean cloth when cleaning the battery upper surface or related part. Do not use organic solvent or detergent for instance gasoline or paint thinner.
- Tighten the battery cap fully.
- If the battery fluid is frozen, do not charge battery or start the engine using other power source. Such act may cause the battery to catch fire.
- Before charging or starting up using other power source, defreeze the battery fluid and check that failures such as battery fluid leak do not exist.
- Always detach the battery from the Machine frame before charging the battery.



CAUTIONS WHEN STARTING UP USING BOOSTER CABLE

Wrong booster cable connection method may result in fire, so always observe the followings.

- Start the engine by two persons, with one standing on the driving operation position in the travel operation panel side.
- When starting using other Machine, be careful to prevent contact between the normal Machine and broken Machine.
- Keep the starter switch key of both the normal Machine and the broken Machine in OFF position when the booster cable is connected.
- Do not connect to wrong side [connecting (+) to (-), (-) to (+)] when connecting the booster cable.
- Start connecting from (+) terminal first, but start disconnecting from (-) terminal (ground) first.
- Connect the ground to the (-) terminal of the battery of the broken Machine when connecting the ground as the last procedure.
- * See "Operation 8.4 Starting Engine with Booster Cable" for details.
- Avoid the contact between clips of the booster cable, and contact between a clip and the Machine when disconnecting the booster cable.



CAUTIONS WHEN CHARGING BATTERY

Improper handling when charging the battery may cause the battery to explode. Follow the manuals attached to the Machine and the charger, and always observe the followings.

* See "Operation 8.3 Cautions in Charging Battery" for details.

- Carry the charger to a location with good ventilation, then remove the battery cap. Doing so causes the hydrogen gas to disperse and prevents explosion.
- Adjust the charger voltage to suit the voltage of the battery to charge. Mistake in adjusting the voltage may cause explosions due to overheat and ignition of the charger.
- Securely fix the (+) charge clip of the charger to the (+) terminal of the battery, then securely fix the (-) charge clip to (-) terminal of the battery.
- Set the charge current to no more than 1/10 of the rated capacity of the battery, or, in case of quick charge, set to the rated capacity of the battery or smaller.
- Excessive charge current may cause leap fire and explosion caused by fluid leak or fluid deficiency.



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